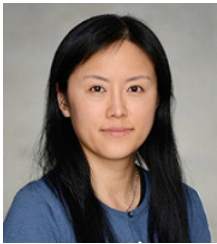


Please join us for our next CPI Seminar Series talk delivered by
Professor Min Dong, University of Ontario Institute of Technology (UOIT).

When: Friday, November 11, 2016 at 11 am to 12 pm

Where: SF 1105 (Sandford Fleming, 10 King's College Road, Room 1105)

Title: Real-time residential energy storage management and load scheduling with renewable integration



Abstract: Integrating renewable energy into the grid system is considered to be a vital solution to reduce energy cost and to maintain a sustainable society and economy. However, renewable energy is less reliable for grid-wide operation and as a local energy source for residential consumers. Energy storage and flexible loads can effectively shift energy and demand across time; they are two promising management solutions to mitigate the randomness of renewable generation and to further reduce electricity cost. As renewable penetration into the power supply increases, the renewable generation with storage solutions at residential homes will become increasingly popular.

In this talk, we will focus on the residential-side energy storage management and load scheduling solutions. We first consider energy storage management for a fixed load supply, and present a real-time energy storage control solution for storage and electricity cost minimization. Different from existing methods, we take a finite time horizon approach to save the system cost over a time period set by the consumer's preference. Furthermore, recognizing the complex and unpredictable system inputs, we assume unknown arbitrary dynamics of renewable generation, load, and electricity pricing in formulating the problem and devising our control solution. Next, we incorporate flexible loads and consider the problem of joint energy storage management and load scheduling for system cost minimization. In particular, we model each individual load task by its requested power intensity and service durations, as well as the maximum and average delay requirements. With our proposed real-time algorithm, we show that the joint load scheduling and energy storage control can in fact be separated and sequentially determined. Furthermore, both load scheduling and energy control decisions have closed-form solutions for simple implementation. Through analysis, we show that the performance gap of our developed real-time algorithm to the non-causal optimal T-slot look-ahead solution has a bounded guarantee.

Bio: Dr. Min Dong is an Associate Professor in the Department of Electrical, Computer and Software Engineering at University of Ontario Institute of Technology (UOIT), Ontario, Canada. She also holds a status-only Associate Professor appointment with the Department of Electrical and Computer Engineering at University of Toronto. Before joining UOIT, she was with Corporate Research and Development, Qualcomm Inc., San Diego, California, from 2004 to 2008. She received the B.Eng. degree from Tsinghua University, Beijing, China, in 1998, and the Ph.D. degree in Electrical and Computer Engineering with minor in Applied Mathematics from Cornell University, Ithaca, NY, in 2004. Her research interests are in the areas of signal processing techniques for communication networks, cooperative communications and networking techniques, and optimization in dynamic networks and systems. Prof. Dong received an Early Researcher Award from Ontario Ministry of Research and Innovation in 2012, an IEEE ICC Best Paper Award in 2012, and the 2004 IEEE Signal Processing Society Best Paper Award. She is a co-author of IEEE ICASSP Best Student Paper of Signal Processing for Communications and Networking in 2016. She served as an Associate Editor for the IEEE Transactions on Signal Processing (2010-2014), and as an Associate Editor for the IEEE Signal Processing Letters (2009-2013). She was the symposium lead co-chair of the Communications and Networks to Enable the Smart Grid Symposium at the IEEE International Conference on Smart Grid Communications (SmartGridComm) in 2014. She has been an elected member of the Signal Processing for Communications and Networking (SP-COM) Technical Committee of IEEE Signal Processing Society since 2013.